HQ-129-X COMMUNICATIONS RECEIVER

TECHNICAL DESCRIPTION

OPERATING INSTRUCTIONS

A PRODUCT
OF

HAMMARLUND MANUFACTURING CO., INC.
460 West 34th Street : : New York 1, N. Y.

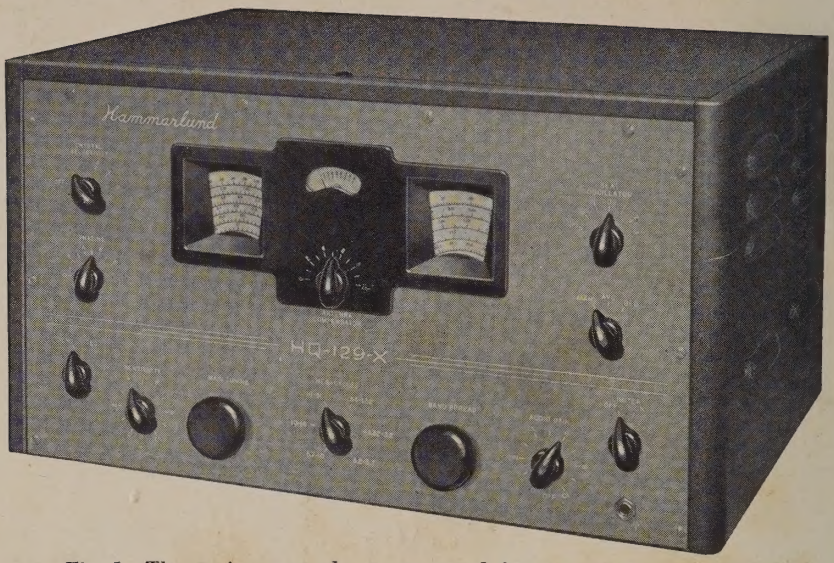


Fig. 1—The tuning controls are arranged for convenient operation.

INTRODUCTION

The new HQ-129-X is a highly efficient modern 11-tube superheterodyne type of communications receiver designed to give years of satisfactory performance. It is the product of years of experience in the development and manufacture of communication receivers.

This receiver is sensitive enough to pick up extremely weak signals and has the selectivity to separate signals in the more crowded bands. It covers a continuous range of frequencies from 540 KC. to 31 MC, or from 555 meters to 9.7 meters, in six bands. Band spread tuning is supplied on the four higher frequency bands, with actual calibration in the 80, 40, 20 and 10 meter amateur bands. Calibration charts may readily be made for any other band such as the short wave international broadcast bands within the range of the four high frequency bands.

While designed particularly for communications use, this receiver provides excellent quality for music and voice reception in both the standard and the short wave broadcast bands. Either loud speaker or headphone reception can be used. Many types of noises and interference are appreciably reduced by the noise limiter and by the special crystal filter, a Hammarlund Patent developed by our engineers. Power hum is negligible. Additional features of design also contribute to the reduction of noise and other interferences. The automatic volume

control aids in keeping music and voice reception at the volume you desire.

A high degree of sensitivity, selectivity and stability is provided by the many especially designed features described in the following pages.

Other items of design are provided for those interested in the reception of telegraph and code signals. These include a stable Beat Frequency Oscillator for the reception of unmodulated or CW signals, an "S" or Signal Strength meter for noting the relative strength of received signals, and a Send-Receive switch which permits operation of a transmitter with a minimum of noise from the receiver.

All the way through, whether for Broadcast or Short Wave reception, this Hammarlund HQ-129-X Receiver is designed and built for high quality performance and for durability.

DESIGN

PRE-SELECTION

The pre-selection or tuned R.F. stage for each band of this receiver is designed for high performance. Entirely individual tuning coils are used for each band. These along with the multi-section variable condenser permit the proper LC ratio for best performance to be used with each band. Both grid and plate circuits are tuned. A compensating condenser, adjustable from the front of the panel, provides perfectly aligned input circuits with any given antenna system. Some antenna suggestions are given on page 14.

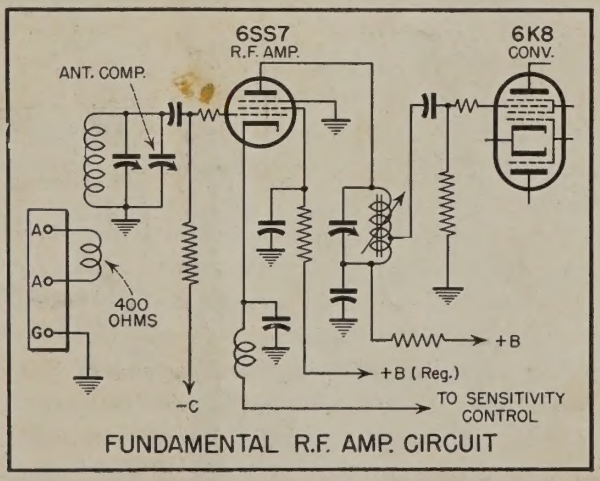


Fig. 2—Tuned R.F. amplifier and converter. Careful circuit design improves signal-to-noise ratio.

These features of design provide high selectivity and high gain and afford maximum signal-to-noise ratio and maximum image signal rejection.

TUNING RANGES

Band	*Frequency*	*Meters Wave Length*
1	540 —1320 KC	555 —227
2	1.32—3.2 MC	227 —93.7
3	3.2 —5.7 MC	93.7—52.6
4	5.7 —10 MC	52.6—30.0
5	10 —18 MC	30 —16.7
6	18 —31 MC	16.7—9.7

TUBE LINE-UP

Symbol		*Type*	*Function*
V-1	6SS7	Triple-Grid Super Control Amplifier, Single Ended	R.F. Amplifier
V-2	6K8	Triode-Hexode Converter	Converter or 1st Detector and Oscillator
V-3	6SS7	See Above	1st I.F. Amplifier
V-4	6SS7	See Above	2nd I.F. Amplifier
V-5	6SS7	See Above	3rd I.F. Amplifier
V-6	6H6	Twin Diode	Detector and Noise Limiter
V-7	6SN7GT/G	Twin Triode Amplifier	1st Audio Amplifier and "S" Meter Tube
V-8	6V6GT/G	Beam Power Amplifier	Audio Power Amplifier and output Tube
V-9	6SJ7	Triple Grid Tube	Beat Frequency Oscillator
V-10	5U4G	Full Wave Rectifier	Rectifier
V11	0C3/VR105	Voltage Regulator	Voltage Regulator

BAND SPREAD

An exceptionally wide band spread of 310 degrees supplied by a special 9 section condenser, is provided on the 4 higher frequency ranges. The band spread dial has 5 scales. Four of these are directly calibrated for the 80, 40, 20 and 10 meter amateur bands. The fifth

scale is an arbitrary 0-200 division scale, provided for making up calibration charts for other bands, such as the short wave international broadcast bands. It is also of use in logging stations.

The following table shows the approximate frequency range that can be covered by the band spread dial at different points on each of the 4 higher frequency bands.

Band	*Low End*	*Middle*	*High End*
3.2 MC— 5.7 MC	.4 MC	.7 MC	1.25 MC
5.7 MC— 10 MC	.2 MC	.5 MC	.9 MC
10 MC— 18 MC	.2 MC	.5 MC	.9 MC
18 MC— 31 MC	.6 MC	1.2 MC	2.2 MC

It should be noted that the Main Tuning dial has been calibrated with the Band Spread dial set at 200 which corresponds to minimum band spread capacity included in the circuit. To use band spread tuning, the Main Tuning dial should be set at the high frequency end of the desired band with the Band Spread dial set at 200. Lower frequencies such as those in the above table will then be obtained as the Band Spread dial setting is decreased.

CONVERTER STAGE

This converter stage uses the triode-hexode 6K8 tube which becomes more efficient as the frequency increases. The design of this converter stage is such that the over-all RF gain is relatively constant and uniform over the whole range of the receiver. This provides uniform operation and provides a true indication of signal strength, as shown on the "S" meter, over all the bands.

The stability of the oscillator is insured by a drift compensator, by low loss tube sockets, and by a ceramic oscillator switch section. It is

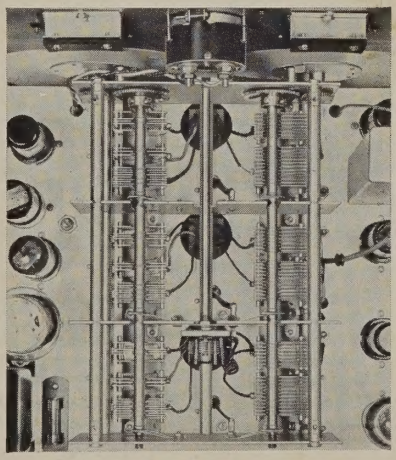


Fig. 3—Precision H.F. tuning assembly.

further insured by its operation from a controlled voltage circuit which uses the OC3/VR-105 Voltage Regulator tube to keep the voltages constant regardless of line voltage fluctuation.

All these factors aid in maintaining the accuracy of the calibration of the receiver.

CRYSTAL FILTER AND PHASING CIRCUIT

The patented crystal filter included in the HQ-129-X Receiver is an outstanding Hammarlund development. Five degrees of selectivity, selected by a six-position panel control, are provided for reducing interference. Steps 1, 2, and 3, varying from broad to fairly sharp, may normally be used for phone reception, depending upon the degree of fidelity desired. Steps 4 and 5, giving sharper selectivity, may be used for CW code reception. The "OFF" position of the control cuts out the crystal filter when broadest selectivity or highest fidelity is desired. The curves of Fig. 5, indicate the degrees of broadness or sharpness that may be obtained.

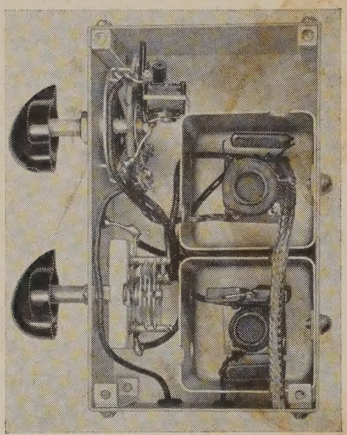


Fig. 4—Crystal Filter unit.

Along with the crystal filter, a phasing control is provided to eliminate interfering heterodynes, within limits. Fig. 5, is a schematic diagram of the filter and phasing circuit. The complete unit is shown in Fig. 4.

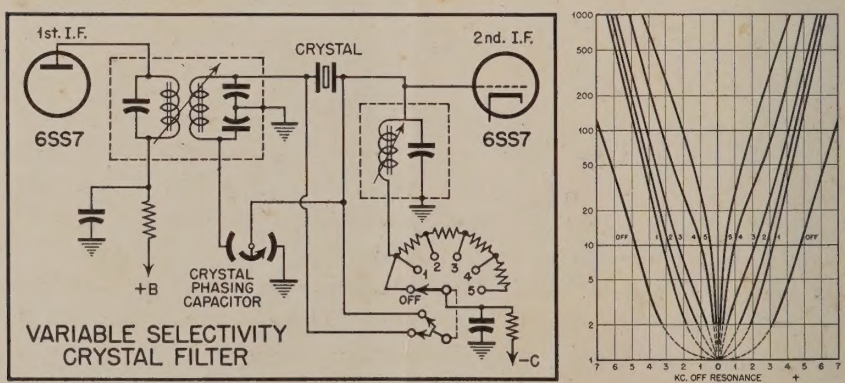


Fig. 5—Selectivity curve and crystal filter circuit.

The over-all gain of the receiver is not noticeably affected by the changes in selectivity of the filter nor is the reading of the "S" Meter appreciably affected.

I. F. AMPLIFIER

Three stages of I.F. amplification are provided. The gain per stage is purposely made low, in order to maintain stability. Iron core permeability-tuned transformers are used for improved performance and for ease of adjusting. Silvered mica condensers are used in each transformer circuit to improve its stability. The intermediate frequency is 455 KC—the R.M.A. standard frequency.

Over-all selectivity curves for this amplifier and the crystal filter are shown in Fig. 5.

A.V.C. SYSTEM

The automatic volume control system in the HQ-129-X gives remarkably smooth operation. The RF stage and the first two I.F. stages are automatically controlled. A switch is provided for shifting from AVC to manual control, when so desired.

SECOND DETECTOR

One section of a 6H6 tube is used for the second detector and for the A.V.C. system. This system is well designed and produces a minimum of distortion.

NOISE LIMITER

The other section of the 6H6 tube is employed as a noise limiter. It is designed to reduce automobile ignition interferences and other similar disturbances to a negligible amount. Its operation does not affect the intelligibility of the received signals, and it may be switched off when so desired.

"S" METER

The signal strength "S" meter which is operated from one section of the 6SN7 Tube shows the relative signal strength of the received signal. The dial is calibrated in units of 1 to 9. Each division represents a doubled signal strength over the previous division. For example, if division 6 corresponds to approximately 6.25 microvolts at the antenna terminals, division 7 represents approximately 12.5 microvolts, 8 represents 25 microvolts, and 9 represents 50. Each division therefore represents a 6 DB step. This relative sensitivity of the meter can be adjusted. In production it is arbitrarily adjusted to a reading

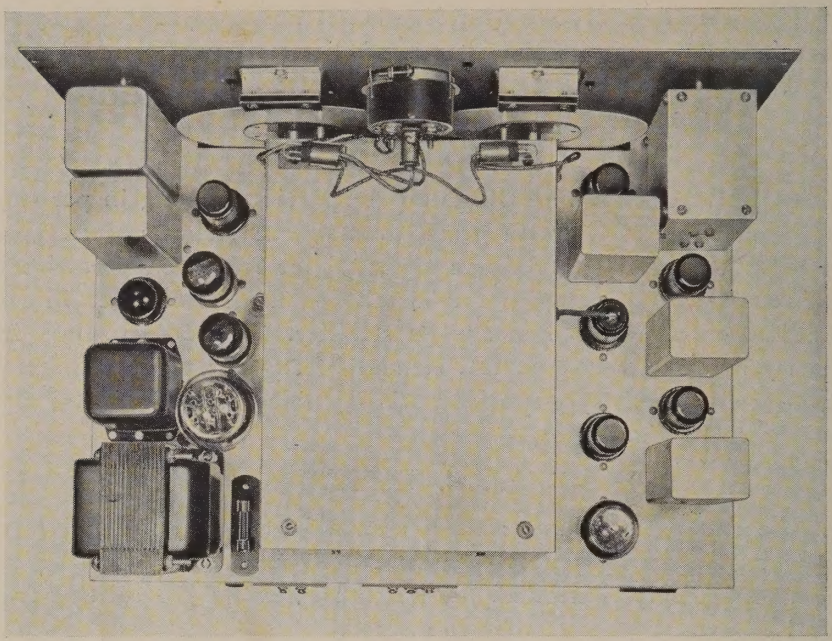


Fig. 6—Top view showing chassis layout.

of 9 for an input of approximately 50 microvolts. Should this not correspond with your previous experience with a strength 9 signal, readjust the slotted shaft, located near the 6V6 and the 6SN7 tubes, as shown on the chart in Fig. 8.

BEAT FREQUENCY OSCILLATOR

The Beat Frequency Oscillator is designed for the reception of CW or unmodulated code signals. The control on the front panel provides a wide selection of beat frequencies for the best tone to cut through any interfering signals. The oscillator is of the electron coupled type, has excellent stability, and is designed to have no material affect on the operation of the I.F. Amplifier. A switch is provided for turning this oscillator on or off at will.

AUDIO AMPLIFIER

The first stage of the audio amplifier is a resistance coupled triode voltage amplifier using one section of the twin triode 6SN7 tube. The final stage uses a 6V6 Beam Power amplifier Tube and supplies an undistorted power output of approximately 3 watts. An output transformer with an output impedance of 6 ohms is used to connect directly to the voice coil of a suitable permanent magnet type dynamic

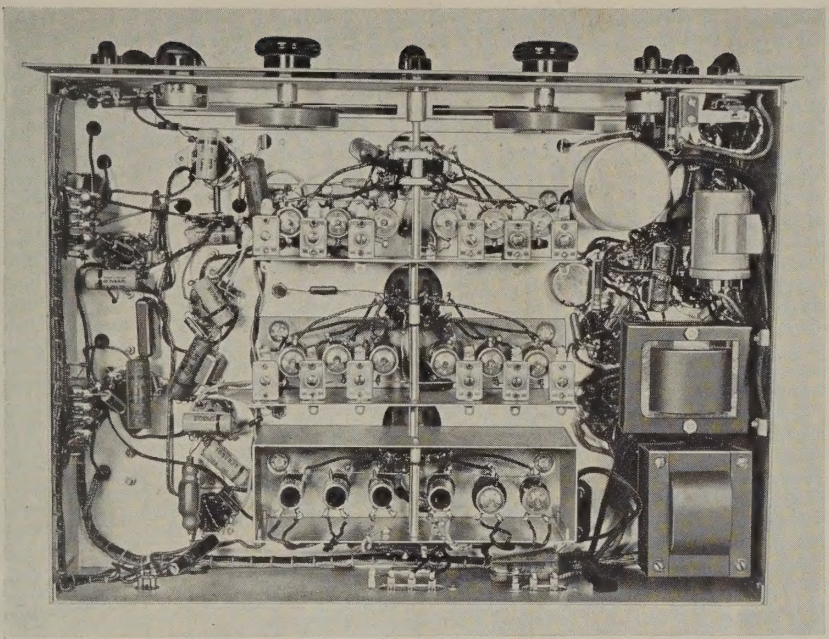


Fig. 7—Bottom view showing placement of parts.

speaker. A phone jack is connected across the same output and disconnects the speaker when headphones are plugged in. A manual gain control is provided.

POWER SUPPLY

All components of the power supply have a very large safety factor in order to insure satisfactory operation over a long period of time. A two-section filter is employed with a total inductance of 40 henries and a total capacitance of 30 microfarads. This heavy duty filter provides humless operation.

CONSTRUCTIONAL DETAILS

In designing the HQ-129-X, HAMMARLUND engineers have gone to considerable length to turn out a receiver that will stand up under various types of service and give years of satisfactory performance. Fig. 6 and Fig. 7, are the top and bottom views of the receiver showing general construction and parts layout. Fig. 3, is the top view with the cover of the tuning capacitor assembly removed.

To the right are the main tuning capacitors and to the left are the band spread capacitors. The small capacitor in the center with the

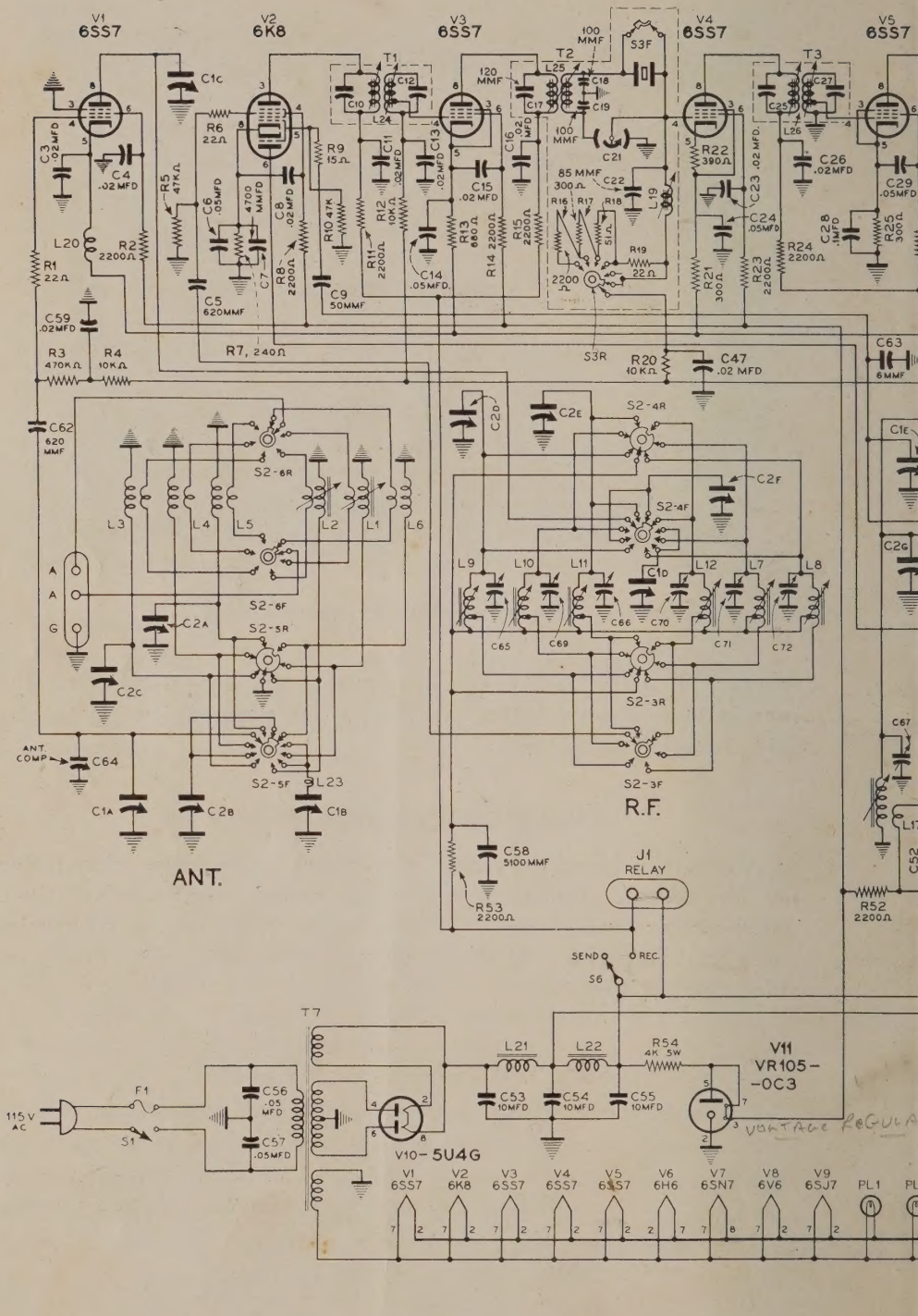
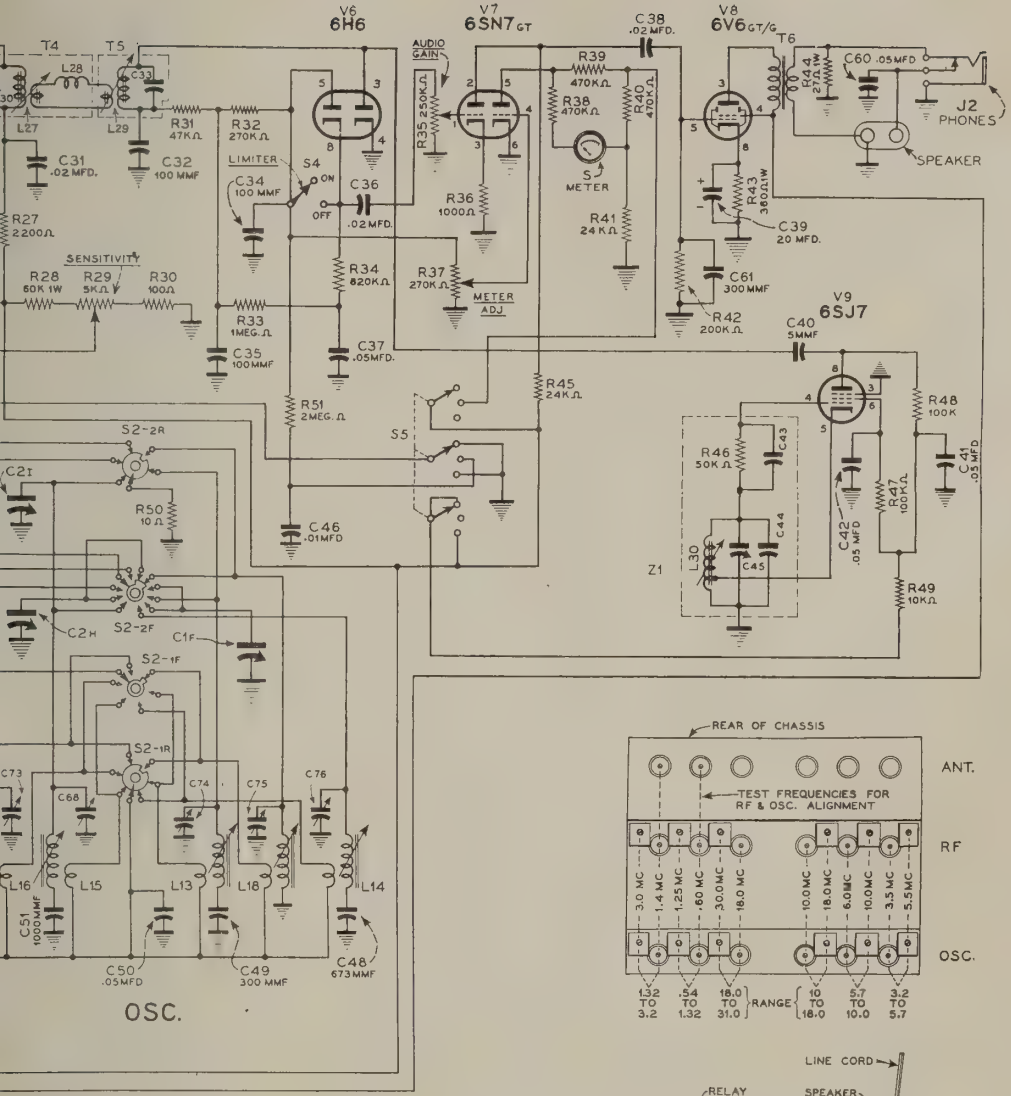
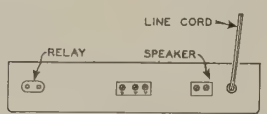
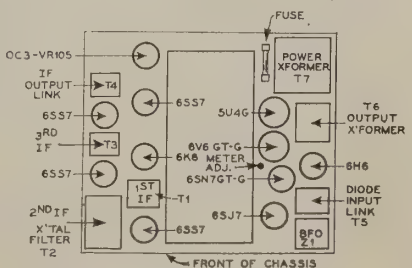

V1 6SS7
V2 6K8
V3 6SS7
V4 6SS7
V5 6SS7
T1
T2
T3
S3F
S3R
R7, 240Ω
R20 10KΩ
C47 .02 MFD
C63 6MMF
S2-4R
S2-6R
S2-4F
S2-6F
S2-5R
S2-3R
S2-5F
S2-3F
ANT.
R.F.
ANT. COMP
C64
C58 5100 MMF
R53 2200Ω
J1 RELAY
R52 2200Ω
SEND
REC.
S6
T7
L21
L22
R54 4K 5W
V11 VR105-0C3
VOLTAGE REGULA
F1
S1
115 V AC
C56 .05 MFD
C57 .05MFD
C53 10MFD
C54 10MFD
C55 10MFD
V10-5U4G
V1 6SS7
V2 6K8
V3 6SS7
V4 6SS7
V5 6SS7
V6 6H6
V7 6SN7
V8 6V6
V9 6SJ7
PL1

Fig. 8







NOTE:—
"S2" RANGE SWITCH SHOWN IN 18 TO 31 MC POSITION, WAFERS NUMBERED FROM 1 TO 6 – No.1 BEING CLOSEST TO KNOB.

ALL OTHER WAFER SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION OF KNOBS ON PANEL EXCEPT LIMITER "S4"

SCHEMATIC DIAGRAM OF HQ-129-X RECEIVER

ircuit diagram.

extended shaft is the antenna compensator. The solid silver contacts can be seen along the rotor shafts of the capacitors. There are three sets of dual silver-to-silver contacts making six for each unit. The solid silver contacts maintain symmetry and insure perfect electrical contact without noise.

The tuning capacitors are driven by special dial arrangements which have 9 to 1 ratio knobs. On the knob shaft behind the front panel is a heavy flywheel to aid in ease of tuning. Just a twist of the knob will make the dial coast a considerable distance. The dials are operated by friction drive. Each dial mechanism connects with the shaft of its capacitors through two gears, one of which is the split type with anti-backlash springs.

Three pilot lights conveniently illuminate the tuning dials and "S" Meter. These are located so that bulbs can be easily replaced.

The panel does not support any of the critical components. Any pressure that may be exerted on the panel will not appreciably affect the adjustment of the receiver.

The 18 tuning inductors, precision wound on low-loss forms, employ both the inductive and capacitive methods of trimming in order to assure perfect circuit alignment.

Thorough shielding and proper placement of components assure a high degree of stability.

OPERATION

After unpacking the rceeiver, check the tubes to make sure that all are properly fitted into their respective socket and that the grid clip is in place on top of the 6K8 tube.

This receiver, unless it is a special model, operates on 105 to 125 volts AC at 50 to 60 cycles. If you are uncertain as to the type of power available for operating the receiver, check with your local power company office. Next connect the antenna and the speaker to the receiver (see chapter on antenna requirements). Two wires from the permanent magnet dynamic speaker connect to the two terminals on the rear of the chassis marked "SPEAKER." The power supply switch that turns the receiver on and off is operated in conjunction with the "AUDIO GAIN" control. Advance this control and while the tubes are heating, set the "MEGACYCLE" switch in the .54-1.32 position, "MAN-AVC-BFO" on AVC, "CRYSTAL SELECTIVITY" on OFF, "SEND-REC." on REC. and "SENSITIVITY" in the extreme clockwise or highest position. Tune in the broadcast stations by using the "MAIN TUNING" dial and the "AUDIO GAIN" control.

For accurate tuning it will be necessary to watch the "S" meter,

which has already been described. The "MAIN TUNING" control should be adjusted for maximum reading of the meter on the station to which you are listening. The ANTENNA COMPENSATOR control, the final adjustment, also should be set for maximum meter reading.

When automatic volume control is not desired the "MAN-AVC-BFO" switch can be set on MAN (Manual), the "AUDIO GAIN" control turned fully clockwise, and the "SENSITIVITY" control employed to provide the desired volume. Headphones may be plugged into the jack in the lower right hand corner of the panel, which action disconnects the speaker. On the rear of the chassis are two pin jacks marked "RELAY" which can be connected to a send-receive relay for break-in operation. With the "SEND-REC" switch on SEND, the receiver is silent but ready for instant use.

Page 4 gives the tuning ranges of each band and its coverage. There is a band spread of 310 degrees for bands 3, 4, 5 and 6, with individual scales for each amateur band and an arbitrary scale, 0-200, for more general use. See Page 5 for more complete information.

The BEAT FREQUENCY OSCILLATOR CONTROL provides a wide choice of tones for CW code operation. Turning the "MAN-AVC-BFO" switch to BFO disconnects the automatic volume control, and the SENSITIVITY control must then be employed. It is often a great help to use the "LIMITER" in short wave reception.

The "PHASING" control normally is set at the arrow in the center of its scale, but may be adjusted to cut out interference from stations on either side of the signal. With the "CRYSTAL SELECTIVITY" switch the operator can choose the degree of selectivity that provides the greatest fidelity with minimum interference. The first three positions are for phone reception and the fifth and sixth for single signal code reception in extremely crowded bands.

To make use of the high degree of accuracy available with the calibrated "BAND SPREAD" dial tune to an oscillator or station of known frequency within the amateur band being used. Set the "BAND SPREAD" dial exactly to the frequency of the station or oscillator, then adjust the "MAIN TUNING" dial to zero beat the signal. The "MAIN TUNING" dial will be slightly off frequently since the "BAND SPREAD" control is designed to tune beyond the legal limits of the band at either end. This is an advantage especially if marker stations are used as calibration references.

For example, the "MAIN TUNING" dial is set at 4.014 mc. for the 80 meter band, 7.32 mc. for the 40 meter band, 14.47 mc. for the 20 meter band, and 30.04 mc. for the 10 meter band. These figures are not exactly true for all receivers. However, they will serve as a

guide in setting the "MAIN TUNING" dial where no signal of known frequency is available.

ANTENNA SUGGESTIONS

Because of the high sensitivity of the HQ-129-X receiver, the antenna is usually not critical. Often an indoor wire 20 to 50 feet long, strung along the base board or along the ceiling molding of a room will give surprisingly good reception. A long single wire outdoor antenna, such as shown in Fig. 9, will generally give entirely satisfactory reception. This wire may be 50 to 75 feet long. The more isolated this antenna is from neighboring objects the better the reception will be.

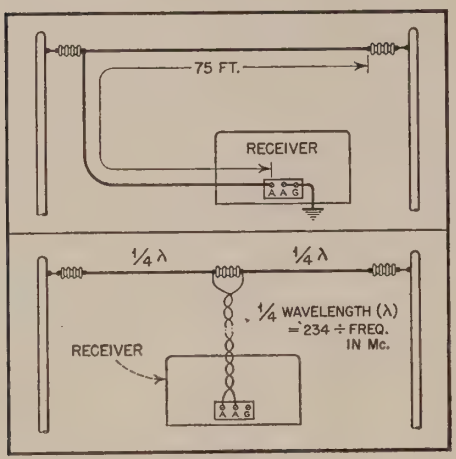


Fig. 9—Antenna suggestions.

In locations where the noise level, such as from motors and other electrical appliances, is high a simple doublet antenna, such as shown in Fig. 9 is often more satisfactory than the single wire antenna. For general reception over all bands each section of the doublet may be from 20 to 50 feet long. Where it is desired to increase the efficiency of reception over a particular band, the best length in feet for each section of the doublet is a quarter wave length, obtained by dividing 234 by the frequency in megacycles. The down lead may be a loosely twisted pair of insulated wires or a twisted pair such as is sold for "all wave" broadcast antennas.

The ground connection also is generally not critical. This receiver is grounded to the power supply and this is usually satisfactory. Sometimes a direct ground will increase the signal pick-up or decrease the noise pick-up. A direct ground can be made by running a wire to a radiator or water pipe or to a pipe driven into moist ground.

REALIGNMENT PROCEDURE—I.F. AMPLIFIER

Tuning of the intermediate-frequency transformers is accomplished by the use of iron-core permeability-tuned coils together with fixed

silvered-mica capacitors, resulting in a very high degree of stability. This, together with the mechanical arrangement provided, precludes the possibility of any appreciable drift or change of setting. Therefore, re-alignment should not be necessary, except when parts are replaced which would affect tuning of the I.F. circuits (like I.F. transformer or crystal).

Alignment of the I.F. channel should not be attempted unless suitable equipment is on hand. Proper alignment is accomplished by the visual method employing a cathode-ray oscilloscope used in conjunction with a frequency-modulated (swept) signal generator, having a fairly constant output. The oscilloscope should be externally synchronized by the signal generator.

The transformers must be tuned for symmetry and proper coincidence of the visible curves, as well as for amplitude. This requires a stage-by-stage alignment, starting with the Diode Input Link Transformer (T5) and continuing back through the First I.F. Transformer (T1). The procedure is as follows:

1) Set the Main Tuning capacitor to .54 M.C. and the band-switch to .54-1.32 M.C., the Send-Receive switch to Receive, the Limiter "off", the MAN-AVC-BFO switch to MAN position and the Crystal Selectivity switch to "off" position.

2) Now, with the generator set at 455 K.C. and applying the signal to the grid (pin #4) of the Third I.F. tube (V5), adjust the plate inductor (L27) of the I.F. Output Link (T4) and the Diode Input inductor (L29) of the Diode Input Link (T5), alternately, to obtain maximum amplitude, symmetry and pattern coincidence on the oscilloscope.

3) Apply the signal input lead to the grid (pin #4) of the 2nd I.F. tube (V4). Turn the two adjustment screws of the 3rd I.F. Transformer to obtain symmetrical, coinciding curve with as much amplitude as possible without disturbing the pattern.

4) Switch the signal input lead to the grid (pin #4) of the 1st I.F. tube (V3), and adjust the lower (plate) inductor (L25) of the Crystal Filter (T2) for maximum amplitude at center of curve.

5) Apply the signal input to the grid cap of 6K8 mixer tube (V2). Adjust screws of 1st I.F. Transformer (T1) as in (3). This should result in a tall selectivity curve with a slightly flattened peak.

6) Turn Crystal Selectivity switch to position #1, set Crystal Phasing pointer on arrow, and adjust the upper (grid) inductor (L19) of the Crystal Filter (T2) for maximum amplitude and

symmetry. Adjust signal input or receiver Sensitivity control to prevent overloading.

7) Switch Crystal Selectivity to position #2 and adjust Phasing control slightly from the arrow position, if necessary, to obtain identical images.

Adjust the signal generator frequency to obtain coincidence of the images, and if complete coincidence is not obtained, alternately make slight adjustments of the phasing control and the signal generator frequency, until images coincide.

These last steps have determined the exact frequency of the quartz crystal and the frequency setting of the signal generator should be left undisturbed.

8) Repeat carefully the complete I.F. alignment procedure (steps 1 through 7) for the crystal frequency.

R.F. AND H.F. OSCILLATOR

As in the case of the I.F. amplifier, the R.F. stage and the H.F oscillator were accurately aligned at the factory with the aid of calibrated oscillators that are frequently compared with standard frequency crystals. These circuits are designed to insure permanence of adjustment and should not be disturbed unless it is positive that readjustment is necessary.

The front row of adjustments, shown on the chart (Fig. 8), control the H.F. Oscillator circuits and consequently the dial calibration. To check these adjustments the band spread dial must be at 200, since that is the setting at which the main dial was calibrated. An accurate test oscillator is necessary. Connect the test oscillator to the antenna terminals and set it and the MAIN TUNING dial at the frequency indicated on the chart. The inductance is adjusted at a low frequency and the trimmer at a high frequency in each band, each being adjusted for maximum response. Generally a small fraction of a turn will suffice. These adjustments mutually affect each other. Therefore, if much change is made at one end of a band, the other end of the same band must be readjusted. This procedure must be repeated until further readjustment at either end is unnecessary.

The adjustments in the middle row control the mixer input circuits. To adjust these, set the oscillator to the frequency indicated on the chart and tune it in on the receiver. Employing an output meter, make the adjustments for peak meter readings. At 30 mc. there is a certain amount of interlocking between the detector and

H.F. oscillator making it necessary to rock the tuning capacitor back and forth while adjusting the trimmer capacitor, in order to avoid a false setting.

MAINTENANCE

The HQ-129-X receiver should give years of satisfactory service without need for repair. The first source of trouble is most likely to be the tubes and in case of failure, they should be checked by a reliable technician. The second most common source of trouble is found in the large assortment of small resistors and capacitors.

The chart below, Fig. 10, gives the values of the voltages between the tube socket terminals and ground or B- negative side of the circuit. The meter scale that should be used for making the check is shown in parenthesis below the voltage. A meter having a resistance of 1000 ohms per volt should be used. Small variations in voltages do not indicate trouble. With the aid of this chart and the circuit diagram (Fig. 8) the ailing capacitor or resistor can be found. The parts list in the back of this book gives the values of the parts and the HAMMARLUND part numbers. Some of them are standard items and can be obtained in the open market. Non-standard parts can be obtained by writing to the factory.

LINE VOLTAGE 115V. A.C. SENSITIVITY MAX. SWITCH ON MAN. NO SIGNAL Limiter-off Audio Gain Max. Send Receive on Receive SWITCH ON AVC BFO

TUBE	RF 6SS7	Conv. 6K8	1–1F 6SS7	2–1F 6SS7	3–1F 6SS7	Detector Limiter 6H6	Output 6V6	Rectifier 5U4G	Reg. VR-105		1st Audio 6SN7-GT/G	BFO 6SJ7
Pin 1 to ground.....	...	...	...	...	...	...	...	Tie Point 212 (300)	Tie Point 93 (150)	...	...	...
Pin 2 to ground.....	...	...	...	...	...	6.2 A.C.	...	300 (750)	...	...	113 (150)	. .
Pin 3 to ground.....	...	210 (300)	6.3 (15)	4.3 (15)	3.5 (15)	—0.4 (15)	254 (300)	Tie Point 212 (300)	Tie Point 108 (150)	...	3.6 (15)	...
Pin 4 to ground.....	...	91 (150)	...	...	...	...	268 (300)	280 A.C.	Tie Point 108 (150)	...	—0.3 (15)	—2.3 (15)
Pin 5 to ground.....	3.2 (15)	...	6.3 (15)	6.3 (15)	3.5 (15)	—0.2 (15)	...	...	108 (150)	...	5.6 (15)	...
Pin 6 to ground.....	102 (150)	98 (150)	105 (150)	105 (150)	97 (150)	Tie Point	Tie Point 210 (300)	280 A.C.	2.8 (15)	...	...	58 (150)
Pin 7 to ground.....	6.2 A.C.	6.2 A.C.	6.2 A.C.	6.2 A.C.	6.2 A.C.	...	6.2 A.C.	Tie Point 212 (300)	Tie Point 108 (150)	...	6.2 A.C.	6.2 A.C.
Pin 8 to ground.....	196 (300)	3.2 (15)	206 (300)	204 (300)	193 (300)	—0.2 (15)	14 (30)	300 (750)	Tie Point 108 (150)	...	...	34.5 (150)

Fig. 10

PARTS LIST HQ-129X

Schematic Designation	Description	HML'D. Part No.
	CAPACITORS	
C1, A-F	Main tuning, variable ..... (Part of SA-610)	
C2, A-I	Band-spread, variable ..... (Part of SA-610)	
C3, 4	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C5	Mica, 620 uuf 500 W.V.D.C.	23005-86B
C6	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C7	Mica, 4700 uuf 500 W.V.D.C.	23015-5B
C8	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C9	Silver mica, 50 uuf 500 W.V.D.C.	23002-11D
C10	Silver mica ..... (Part of T1, I.F. Transformer #6335)	
C11	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C12	Silver mica ..... (Part of T1, I.F. Transformer #6335)	
C13	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C14	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C15, 16	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C17	Silver mica, 120 uuf 500 W.V.D.C.	23003-96D
C18, 19	Mica, 100 uuf 500 W.V.D.C.	23001-48B
C21	Crystal phasing, variable	SA-604
C22	Silver mica, 85 uuf 500 W.V.D.C.	6180
C23	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C24	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C25	Silver mica ..... (Part of T3, I.F. Transformer #6335)	
C26	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C27	Silver mica ..... (Part of T3, I.F. Transformer #6335)	
C28	Paper tubular, 0.1 uf 500 W.V.D.C.	23912-3
C29	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C30	Silver mica, 95 uuf 500 W.V.D.C.	6195
C31	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C32	Mica, 100 uuf 500 W.V.D.C.	23001-48B
C33	Silver mica, 95 uuf 500 W.V.D.C.	6195
C34, 35	Mica, 100 uuf 500 W.V.D.C.	23001-48B
C36	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C37	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C38	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C39	Electrolytic, 20 uf 25 W.V.D.C. ..... (Part of 23840-1)	
C40	Silver mica, 5 uuf 500 W.V.D.C.	23002-1D
C41, 42	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C43	Silver mica ..... (Part of Z1, B.F.O. Assy. #26021-G1)	
C44	Silver mica ..... (Part of Z1, B.F.O. Assy. #26021-G1)	
C45	B.F.O., variable ..... (Part of Z1, B.F.O. Assy. #26021-G1)	SA-681
C46	Paper tubular, .01 uf 200 W.V.D.C.	23912-4
C47	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C48	Silver mica 673 uuf 500 W.V.D.C.	6061
C49	Silver mica 300 uuf 500 W.V.D.C.	23003-105D
C50	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C51	Mica, 1000 uuf 500 W.V.D.C.	23015-40B
C52	Mica, 1500 uuf 500 W.V.D.C.	23015-20B
C53,54,55	Electrolytic 10/10/10 uf 450 W.V.D.C. ... (Part of 23840-1)	
C56, 57	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C58	Mica, 5100 uuf 500 W.V.D.C.	23015-16B
C59	Paper tubular, .02 uf 500 W.V.D.C.	23912-1
C60	Paper tubular, .05 uf 500 W.V.D.C.	23912-2
C61	Mica 300 uuf 500 W.V.D.C.	23001-75B
C62	Mica 620 uuf 500 W.V.D.C.	23005-86B
C63	Ceramic N750K 6uuf 500 W.V.D.C.	23023-34
C64	Antenna Comp., variable ..... (Part of SA-610)	SA-617
C65-68	Trimmer, mica, 1.5 - 9 uuf	6189-G2
C-69-76	Trimmer, mica, 3-35 uuf	6055-G1

PARTS LIST HQ-129X—Cont.

Schematic Designation	Description	HML'D. Part No.
	CAPACITORS—Continued	
F1	Fuse, 2 amp. type 3AG	15928-7
J1	Relay jack	6142
J2	Phone jack	6087
	INDUCTORS	
L1	Antenna coil assembly .54-1.32 mc range	26051-G1
L2	Antenna coil assembly 1.32-3.2 mc range	26051-G2
L3	Antenna coil 3.2-5.7 mc range	6013
L4	Antenna coil 5.7-10 mc range	6016
L5	Antenna coil 10-18 mc range	6019
L6	Antenna coil 18-31 mc range	6022
L7	R.F. coil assembly .54-1.32 mc range	26047-G2
L8	R.F. coil assembly 1.32-3.2 mc range	26047-G1
L9	R.F. coil assembly 3.2-5.7 mc range	26047-G6
L10	R.F. coil assembly 5.7-10 mc range	26047-G5
L11	R.F. coil assembly 10-18 mc range	26047-G4
L12	R.F. coil assembly 18-31 mc range	26047-G3
L13	H.F. osc. coil assembly .54-1.32 mc range	26030-G2
L14	H.F. osc. coil assembly 1.32-3.2 mc range	26030-G1
L15	H.F. osc. coil assembly 3.2-5.7 mc range	26030-G6
L16	H.F. osc. coil assembly 5.7-10 mc range	26030-G5
L17	H.F. osc. coil assembly 10-18 mc range	26030-G4
L18	H.F. osc. coil assembly 18-31 mc range	26030-G3
L19	Crystal filter grid coil (Part of Assy. #SA788)	
L20	R.F. choke (CHX)	6181
L21	Filter choke	6083
L22	Filter choke	6084
L23	R.F. choke	26054-1
L24	1st I.F. coil (Part of T1, #6335)	
L25	Crystal filter plate coil (Part of Assy. #SA787)	
L26	3rd I.F. coil (Part of T3, #6335)	
L27	I.F. output coil (Part of T4, #SA797)	
L28	Series coupling coil (Part of T4, #SA797)	
L29	Diode input coil (Part of T5, #SA799)	
L30	B.F.O. coil (Part of Z1, #26021-G1)	
M1	"S" meter	4903
PL1, 2, 3	Pilot lamp #47 6.3 V., .15 amp.	16004
	RESISTORS	
R1	22 ohms, ½ W.	19302-9
R2	2200 ohms, ½ W.	19301-40
R3	470,000 ohms, ½ W.	19301-96
R4	10,000 ohms, ½ W.	19301-56
R5	47,000 ohms, ½ W.	19301-72
R6	22 ohms, ½ W.	19302-9
R7	240 ohms, ½ W.	19302-34
R8	2200 ohms, ½ W.	19301-40
R9	15 ohms, ½ W.	19302-5
R10	47,000 ohms, ½ W.	19301-72
R11	2200 ohms, ½ W.	19301-40
R12	10,000 ohms, ½ W.	19301-56
R13	680 ohms, ½ W.	19301-28
R14,15,16	2200 ohms, ½ W.	19301-40
R17	300 ohms, ½ W.	19301-196
R18	51 ohms, ½ W.	19301-187
R19	22 ohms, ½ W.	19302-9
R20	10,000 ohms, ½ W.	19301-56

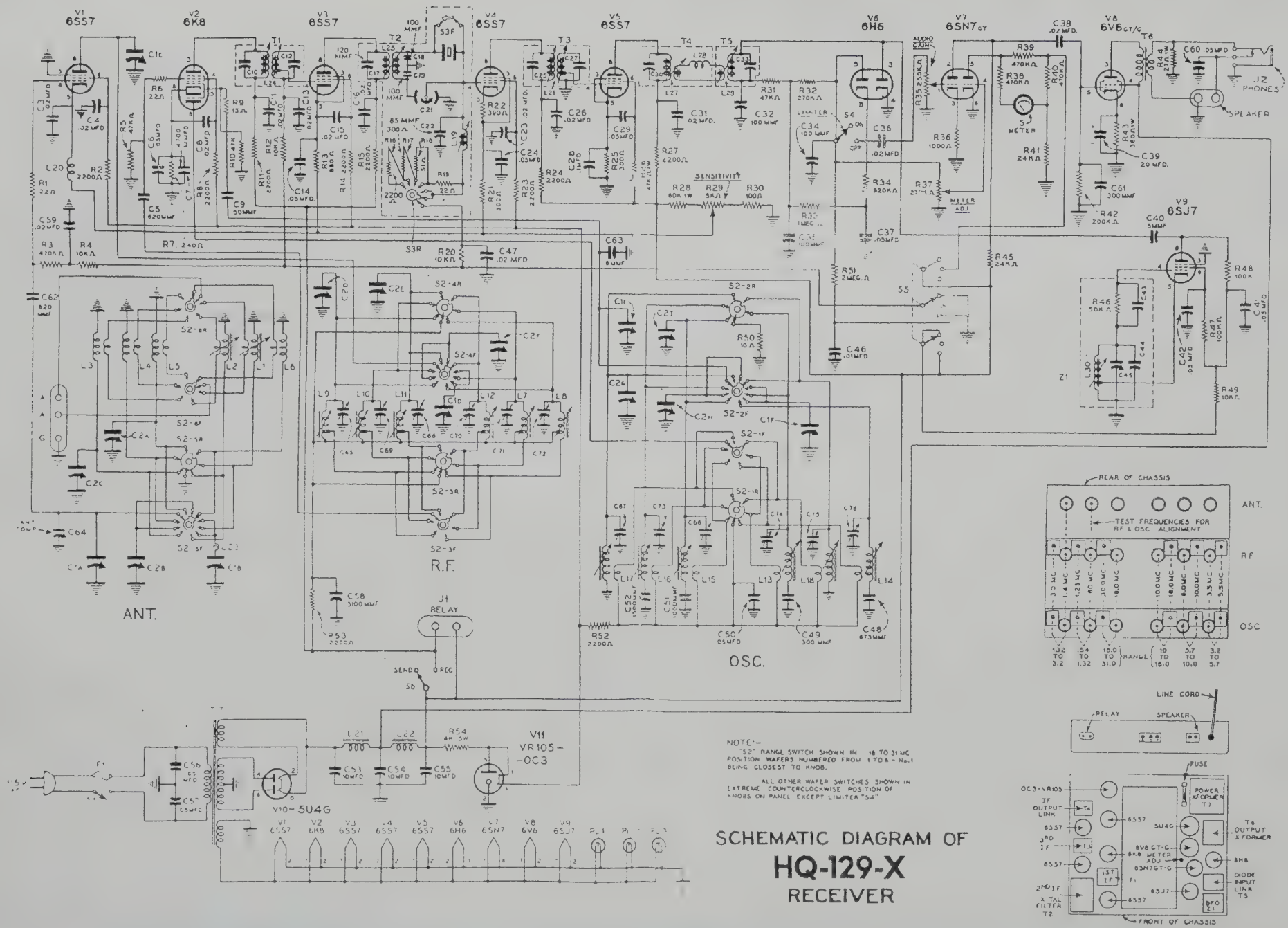
Hamilton County Copy - 1.32-3.2 - .66

PARTS LIST HQ-129X—Cont.

Schematic Designation	Description	HML'D. Part No.
	RESISTORS—Continued	
R21	300 ohms, ½ W.	19301-196
R22	390 ohms, ½ W.	19301-22
R23, 24	2200 ohms, ½ W.	19301-40
R25	300 ohms, ½ W.	19301-196
R26	47,000 ohms, 1 W.	19303-61
R27	2200 ohms, ½ W.	19301-40
R28	60,000 ohms, 1 W.	19310-231
R29	Potentiometer, 5,000 ohms	15305-4
R30	100 ohms, ½W.	19301-8
R31	47,000 ohms, ½ W.	19301-72
R32	270,000 ohms, ½ W.	19301-90
R33	1 Meg ohms, ½ W.	19301-104
R34	820,000 ohms, ½ W.	19301-102
R35	Potentiometer, 250,000 ohms (Switch Attached)	15356-1
R36	1,000 ohms, ½ W.	19301-32
R37	Potentiometer, 270,000 ohms	15357-1
R38,39,40	470,000 ohms, ½ W.	19301-96
R41	24,000 ohms, ½ W.	19301-213
R42	200,000 ohms, ½ W.	19301-220
R43	360 ohms, 1 W.	19305-38
R44	27 ohms, 1 W.	19305-11
R45	24,000 ohms, 1 W.	19310-187
R46	50,000 ohms (Part of Z1, B.F.O. Assy. #26021-G1)	
R47, 48	100,000 ohms, ½ W.	19301-80
R49	10,000 ohms, ½ W.	19301-56
R50	10 ohms, ½ W.	19302-1
R51	2 meg. ohms, ½ W.	19301-169
R52, 53	2200 ohms, ½ W.	19301-40
R54	4,000 ohms, 5 W., wire wound	19380-47
	SWITCHES	
S1	(Part of R29, potentiometer #15305-4)	
S2-1 F,R	H.F. Osc. Plate	6331
S2-2 F,R	H.F. Osc. Grid	6332
S2-3 F,R	Det. Grid Tap	6064
S2-4 F,R	R.F. Plate	6063
S2-5 F,R	R.F. Grid	6063
S2-6 F,R	Antenna	6062
S3 F,R	Crystal filter assy.	26035-G1
S4	Limiter	6333
S5	MAN-AVC-BFO	6097
S6	Send-Rec.	6333
	TRANSFORMERS	
T1	1st I.F.	6335
T2	Crystal filter assy. (2nd I.F.)	SA785
T3	3rd I.F.	6335
T4	I.F. output coil assy. (Link)	SA797
T5	Diode input coil assy. (Link)	SA799
T6	Audio output transformer	6086
T7	Power transformer	26012
X1	Quartz crystal	6338
Z1	B.F.O. assembly	26021-G1

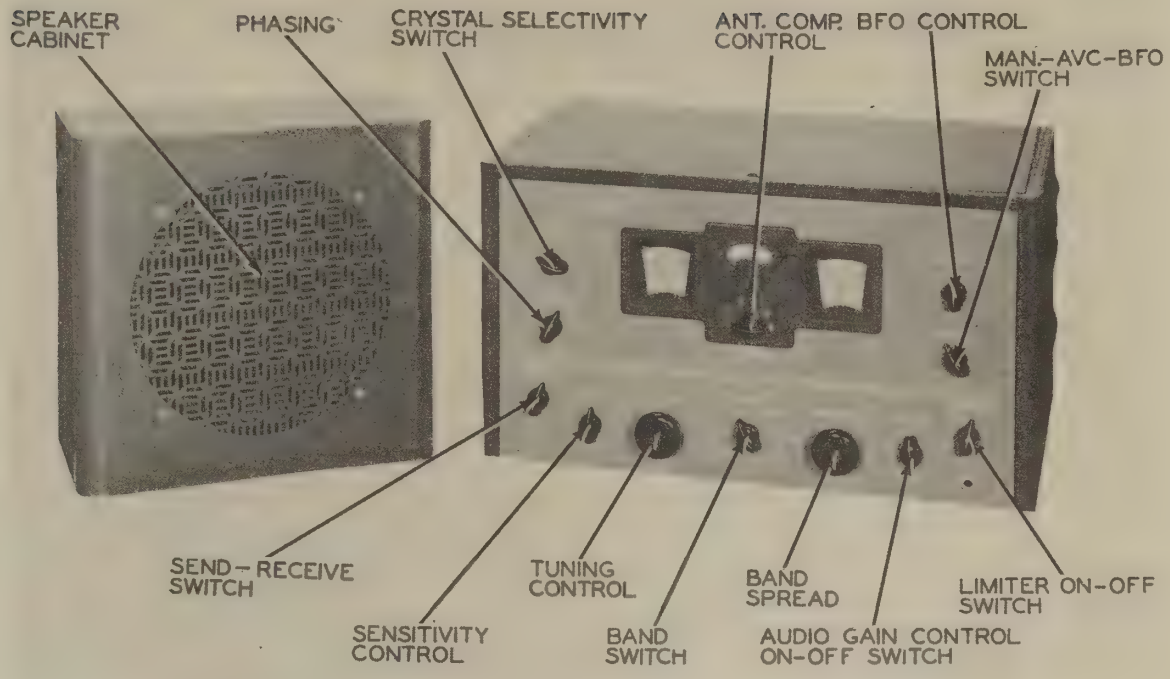
Printed in U.S.A.

Form 2-7-3, 446



SCHEMATIC DIAGRAM OF HQ-129-X RECEIVER

Fig. 8—Circuit diagram.



HAMMARLUND MODEL HQ-129-X

TRADE NAME	Hammarlund Model HQ-129-X
MANUFACTURER	Hammarlund Mfg. Co., 460 W. 34th Street, New York, N.Y.
TYPE SET	AC Operated 6 Band Superheterodyne Communications Receiver
TUBES (ELEVEN)	Types, 6SS7 RF Amp., 6K8 Converter, 6SS7 1st IF Amp., 6SS7 2nd IF Amp., 6SS7 3rd IF Amp., 6H6 Det.-Noise Limiter, 6SN7GT AF-"S" Meter Tube, 6V6GT Power Output, 6SJ7 BFO, 5U4G Rectifier, OC3/VR105 Voltage Regulator.
POWER SUPPLY	105-125 Volts AC
RATING	.750 Amps. @ 117V AC
TUNING RANGE	Broadcast - 540-1320KC, 1.32-3.2MC Short Wave- 3.2-5.7MC, 5.7-10MC, 10-18MC, 18-31MC.

HAMMARLUND
MODEL HQ-129-X

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SS7	6SS7	8N	
2	Converter	6K8	6K8	8K	
3	1st IF Amp.	6SS7	6SS7	8N	
4	2nd IF Amp.	6SS7	6SS7	8N	
5	3rd IF Amp.	6SS7	6SS7	8N	
6	Det.-Noise Lim.	6H6	6H6	7Q	
7	AF-"S" Meter Tube	6SN7GT	6SN7GT	8BD	
8	Power Output	6V6GT	6V6GT	7AC	
9	BFO	6SJ7	6SJ7	8N	
10	Rectifier	5U4G	5U4G	5T	
11	Voltage Reg.	OC3/VR105	OC3/VR105	4AJ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
12A	10	450	23840-1	FP424	DY-3x10-450/20-25	EL-431	AF2222J	UP7DJ51	▲ Filter
B	10	450							■ "
C	10	450							▲ "
D	20	25					PRS25-10*		Cath. Bypass
13	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	Line Bypass
14	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	" "
15	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	Voice Coil Bypass
16	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	6SJ7 Plate Decoupling
17	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	6SJ7 Screen Bypass
18	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	Audio Coupling
19	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	" "
20	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	Noise Lim. Bias. Bypass
21	.01	200	23912-4	TP421	S-4-01	TC-11	484-01	DT4S1	AVC Filter
22	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	3rd IF Plate Bypass
23	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	Osc. Plate Decoupling
24	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	3rd IF Screen Bypass
25	.1	500	23912-3	TP418	S-6-1	TC-1	684-.1	DT6P1	3rd IF Cath. Bypass
26	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	2nd IF Plate Bypass
27	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	2nd IF Screen Bypass
28	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	2nd IF Supp. Bypass
29	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	AVC Filter
30	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	1st IF Plate Bypass
31	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	1st IF Screen Bypass
32	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	AVC Filter
33	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	1st IF Cath. Bypass
34	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	Conv. Plate Bypass
35	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	Conv. Screen Bypass
36	.05	500	23912-2	TP415	S-6-05	TC-15	684-05	DT6S5	Conv. Cath. Bypass
37	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	RF Screen Bypass
38	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	RF Cath. Bypass
39	.02	500	23912-1	TP412	S-6-02	TC-12	684-02	DT6S2	AVC Filter
40	5	500	23002-1D	MCB205	MOS.5-55	MS-55	1469-00005	5R5V5	BFO Coupling
41	300	500	23001-75D	MC241	MO.5-33	MS-33	1468-0003	5W5T3	6V6 Grid Bypass
42	100	500	23001-48B	MC235	MO.5-31	1FM-31	1468-0001	5W5T1	Diode Filter
43	100	500	23001-48B	MC235	MO.5-31	1FM-31	1468-0001	5W5T1	" "
44	100	500	23001-48D	MC235	MO.5-31	1FM-31	1468-0001	5W5T1	6H6 Diode Plate Bypass
45	673	500	6061						Fixed Padder
46	300	500	23003-105D	MC241	MO.5-33	MS-33	1468-0003	5W5T3	" "
47	1000	500	23015-40B	MC255	MO.3-21	1FM-21	1468-001	1W5D1	" "
48	1500	500	23015-20B	MC256	MW.5-215	1FM-215	1467-0015	1W5D15	" "
49	6	500	23023-34						Fixed Trimmer Cer.
50	5100	500	23015-16B						RF Plate Decoupling
51	620	500	23005-86B						RF Coupling
52	50	500	23002-11D	MCB225	MOS.5-45	MS-45	1469-00005	5R5Q5	Osc. Grid Capacitor
53	4700	500	23015-5B						Conv. Cath. Bypass
54	620	500	23005-86B						RF Coupling

*Parallel with one section of AF to obtain bypass section.

PARTS LIST AND DESCRIPTIONS (Continued)

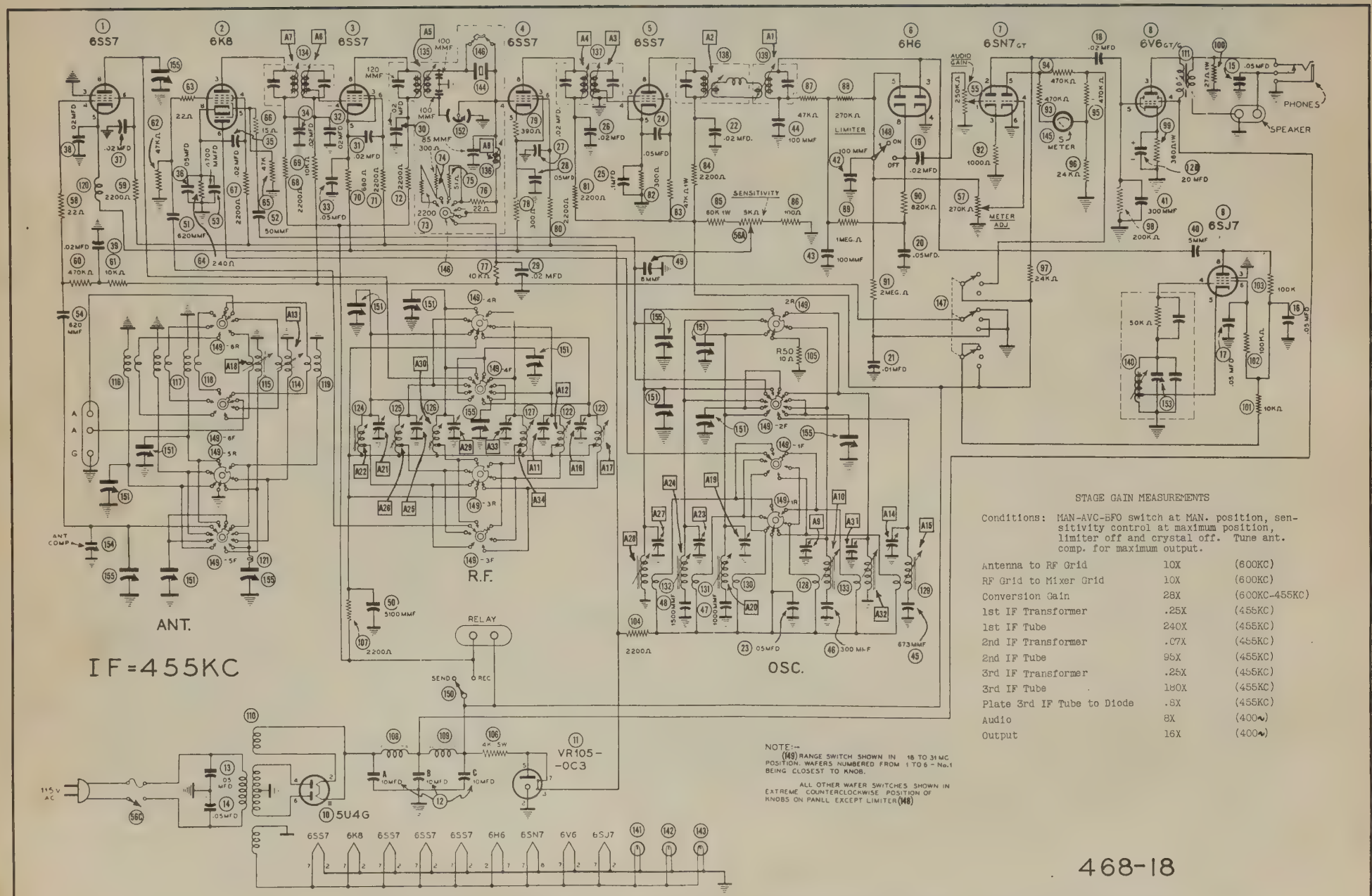
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
55A	250KΩ	1	15358-1	MR44	D13-130	M-64-Z	Audio Gain Control
B	Shaft		Not Req.	Not Req.	A	Not Req.	Attach to 55A per instructions
C	Switch		" "	M26	41	SW-A	" " " " "
56A	5000Ω	1	15305-4	MR14	D11-114	M-19-S	Sensitivity Control
B	Shaft		Not Req.	Not Req.	A	Not Req.	Attach to 56A per instructions
57A	270KΩ	1	15357-1	UM149	D11-130	AM-55-S	Meter Adjustment Control
B	Shaft		Not Req.	SS12	E #	KSS-3#	Attach to 57A per instructions

#Split in knurled shaft may be used as screwdriver slot.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
58	22Ω	½	19302-9	BW-½-22	Red-Red-Blk. Parasitic Suppressor
59	2200Ω	½	19301-40	BTS-2200	Red-Red-Red RF Screen Dropping
60	470KΩ	½	19301-96	BTS-470K	Yl.-Vi.-Yl. AVC Network
61	10KΩ	½	19301-56	BTS-10K	Br.-Blk.-Or. AVC Network
62	47KΩ	½	19301-72	BTS-47K	Yl.-Vi.-Or. Converter Grid
63	22Ω	½	19302-9	BW-½-22	Red-Red-Blk. Parasitic Suppressor
64	240Ω	½	19302-34	BW-½-270	Red-Yl.-Br. Converter Cathode
65	47KΩ	½	19301-72	BTS-47K	Yl.-Vi.-Or. Osc. Grid
66	15Ω	½	19302-5	BW-½-15	Br.-Grn.-Blk. Parasitic Suppressor
67	2200Ω	½	19301-40	BTS-2200	Red-Red-Red Converter Screen Dropping
68	2200Ω	½	19301-40	BTS-2200	Red-Red-Red Converter Plate Filter
69	10KΩ	½	19301-56	BTS-10K	Br.-Blk.-Or. AVC Network
70	680Ω	½	19301-28	BTS-680	Blue-Gray-Br. 1st IF Cathode
71	2200Ω	½	19301-40	BTS-2200	Red-Red-Red 1st IF Screen Dropping
72	2200Ω	½	19301-40	BTS-2200	Red-Red-Red 1st IF Plate Filter
73	2200Ω	½	19301-40	BTS-2200	Red-Red-Red Selectivity Control
74	300Ω	½	19301-196	BW-½-270	Or.-Blk.-Br. Selectivity Control
75	51Ω	½	19301-187	BW-½-47	Grn.-Br.-Blk. Selectivity Control
76	22Ω	½	19302-9	BW-½-22	Red-Red-Blk. Selectivity Control
77	10KΩ	½	19301-56	BTS-10K	Br.-Blk.-Or. AVC Network
78	300Ω	½	19301-196	BW-½-270	Or.-Blk.-Br. Bias
79	390Ω	½	19301-22	BW-½-390	Or.-White-Br. 2nd IF Cathode
80	2200Ω	½	19301-40	BTS-2200	Red-Red-Red 2nd IF Screen Dropping
81	2200Ω	½	19301-40	BTS-2200	Red-Red-Red 2nd IF Plate Filter
82	300Ω	½	19301-196	BW-½-270	Or.-Blk.-Br. 3rd. IF Cathode
83	47KΩ	1	19303-61	BTA-47K	Yl.-Vi.-Or. 3rd. IF Screen Dropping
84	2200Ω	½	19301-40	BTS-2200	Red-Red-Red 3rd IF Plate Filter
85	62KΩ	1	19310-231	BTA-68K	Blue-Red-Or. Sensitivity Limit
86	100Ω	½	19301-8	BW-½-100	Br.-Blk.-Br. Sensitivity Limit
87	47KΩ	½	19301-72	BTS-47K	Yl.-Vi.-Or. IF Filter
88	270KΩ	½	19301-90	BTS-270K	Red-Vi.-Yl. Limiter Plate Load
89	1 Meg.	½	19301-104	BTS-1 Meg.	Br.-Blk.-Grn. Limiter RF Blocking
90	820KΩ	½	19301-102	BTS-820K	Blue-Red-Yl. Limiter Cathode
91	2 Meg.	½	19301-169	BTS-2.2 Meg.	Red-Blk.-Grn. AVC Network
92	1000Ω	½	19301-32	BTS-1000	Br.-Blk.-Red 1st AF Cathode
93	470KΩ	½	19301-96	BTS-470K	Yl.-Vi.-Yl. Meter Bridge
94	470KΩ	½	19301-96	BTS-470K	Yl.-Vi.-Yl. Meter Bridge
95	470KΩ	½	19301-96	BTS-470K	Yl.-Vi.-Yl. Meter Bridge
96	24KΩ	½	19301-213	BTS-22K	Red-Yl.-Or. Meter Bridge
97	24KΩ	1	19301-187	BTA-22K	Red-Yl.-Or. 1st AF Plate Load
98	200KΩ	½	19301-220	BTS-220K	Red-Blk.-Yl. Output Grid
99	390Ω	1	19305-38	BTA-390	Or.-White-Br. Output Cathode
100	27Ω	1	19305-11	BW-1-27	Red-Vi.-Blk. Output Transformer Shunt
101	10KΩ	½	19301-56	BTS-10K	Br.-Blk.-Or. BFO Decoupling
102	100KΩ	½	19301-80	BTS-100K	Br.-Blk.-Yl. BFO Screen Dropping
103	100KΩ	½	19301-80	BTS-100K	Br.-Blk.-Yl. BFO Plate Load
104	2200Ω	½	19301-40	BTS-2200	Red-Red-Red Osc. Plate Decoupling
105	10Ω	½	19302-1	BW-½-10	Br.-Blk.-Blk. Unused Osc. Coil Shunt
106	4000Ω	5	19380-47	AB-4000	Filter
107	2200Ω	½	19301-40	BTS-2200	Red-Red-Red RF Plate Decoupling



NOTE:— (149) RANGE SWITCH SHOWN IN 18 TO 31 MC POSITION. WAFERS NUMBERED FROM 1 TO 6 - No.1 BEING CLOSEST TO KNOB.

ALL OTHER WAFER SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION OF KNOBS ON PANLL EXCEPT LIMITER (148)

STAGE GAIN MEASUREMENTS

Conditions: MAN-AVC-BFO switch at MAN. position, sensitivity control at maximum position, limiter off and crystal off. Tune ant. comp. for maximum output.

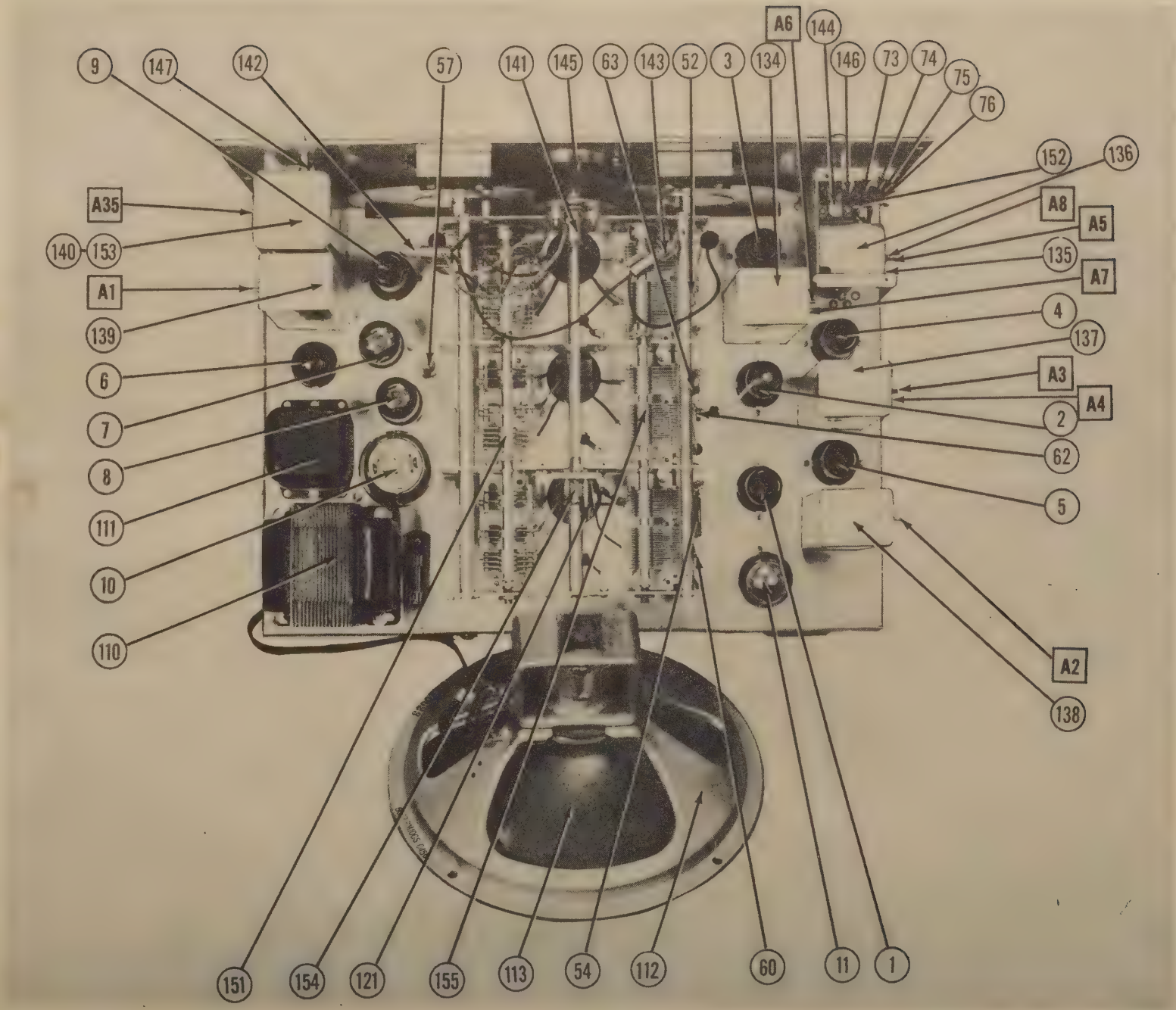
Antenna to RF Grid	10X	(600KC)
RF Grid to Mixer Grid	10X	(600KC)
Conversion Gain	28X	(600KC-455KC)
1st IF Transformer	.25X	(455KC)
1st IF Tube	240X	(455KC)
2nd IF Transformer	.07X	(455KC)
2nd IF Tube	95X	(455KC)
3rd IF Transformer	.25X	(455KC)
3rd IF Tube	180X	(455KC)
Plate 3rd IF Tube to Diode	.8X	(455KC)
Audio	8X	(400~)
Output	16X	(400~)

468-18

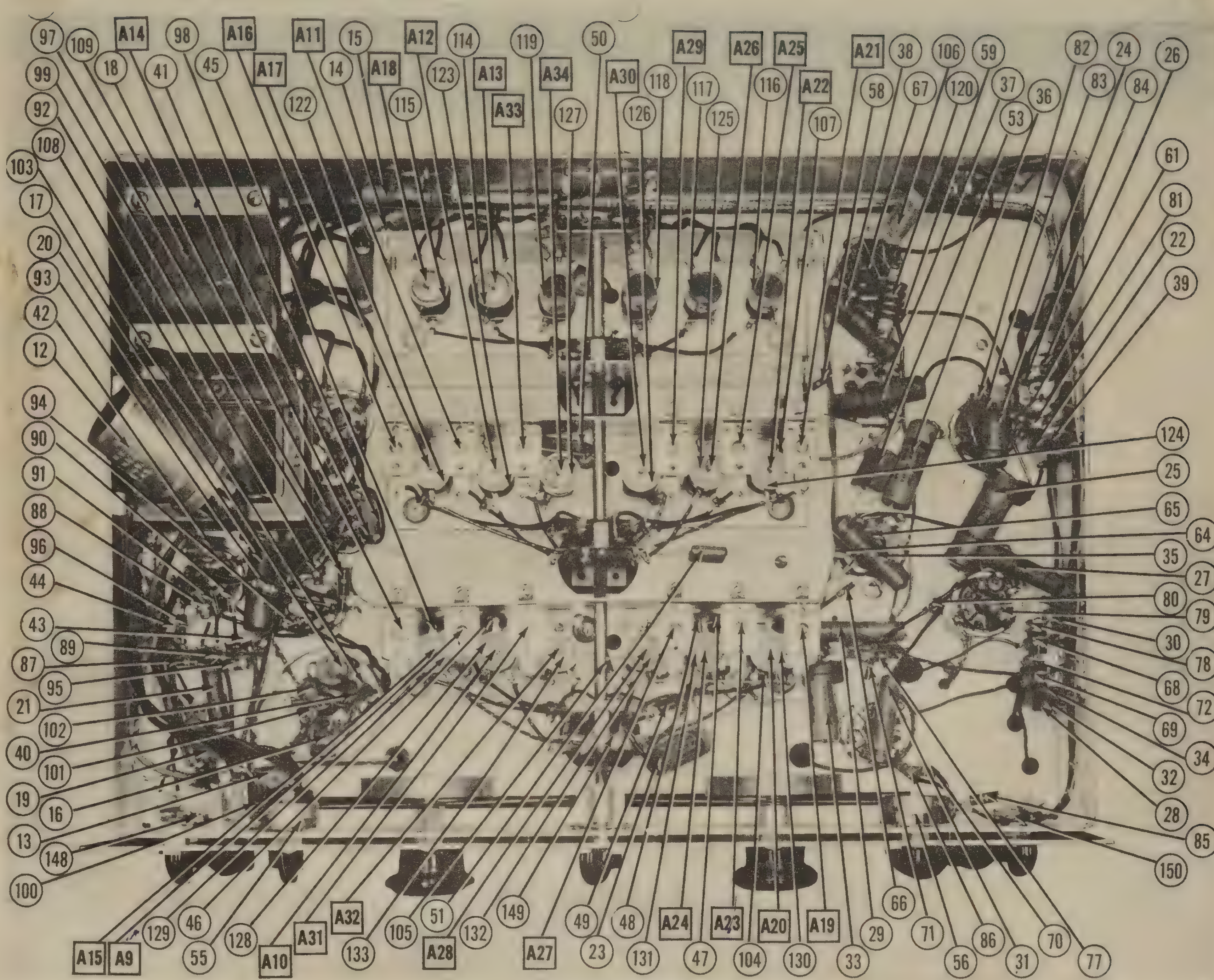
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



NOTE. 1. VOLTAGE AND RESISTANCE READINGS TAKEN WITH AUDIO GAIN AND SENSITIVITY CONTROLS AT MAXIMUM LIMITER AND CRYSTAL SWITCHES OFF.

2. READINGS ON 6SJ7 TAKEN WITH SWITCH IN BFO POSITION.

3. READINGS ON 6SN7GT TAKEN SWITCH IN AVC POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6SS7	0V.	0V.	0V.	0V.	3.2V.DC	107V.DC	6.35VAC	182V.DC	
2	6K8	0V.	0V.	200V.DC	97V.DC	0V.	103V.DC	6.35VAC	3.4V.DC	0V
3	6SS7	0V.	0V.	6.8V.DC	0V.	6.8V.DC	110V.DC	6.35VAC	195V.DC	
4	6SS7	0V.	0V.	4.6V.DC	0V.	6.8V.DC	110V.DC	6.35VAC	195V.DC	
5	6SS7	0V.	0V.	3.7V.DC	0V.	3.7V.DC	113V.DC	6.35VAC	184V.DC	
6	6H6	0V.	6.35V.AC	-2V.DC	0V.	-3V.DC	-05V.DC	0V.	-3V.DC	
7	6SN7GT	0V.	120V.DC	3.8V.DC	-4V.DC	12V.DC	0V.	6.35VAC	0V.	
8	6V6GT	0V.	0V.	275V.DC	275V.DC	0V.	204V.DC	6.35VAC	15V.DC	
9	6SJ7	0V.	0V.	0V.	-7.8V.DC	0V.	72V.DC	6.35VAC	32V.DC	
10	5U4G	204V.DC	310V.DC	204V.DC	295V.AC	0V.	295V.AC	204V.DC	310V.DC	
11	0C3/VR105	97V.DC	0V.	112V.DC	112V.DC	112V.DC	28V.DC	112V.DC	112V.DC	

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6SS7	0Ω	0Ω	0Ω	2.6MEG.	125Ω	64KΩ	.25Ω	64KΩ	
2	6K8	0Ω	0Ω	60KΩ	64KΩ	45KΩ	64KΩ	.25Ω	220Ω	46KΩ
3	6SS7	0Ω	0Ω	750Ω	2.1MEG.	750Ω	64KΩ	.25Ω	60KΩ	
4	6SS7	0Ω	0Ω	390Ω	2.1MEG.	740Ω	64KΩ	.25Ω	60KΩ	
5	6SS7	0Ω	0Ω	300Ω	1Ω	300Ω	105KΩ	.25Ω	60KΩ	
6	6H6	0Ω	.25Ω	510KΩ	0Ω	230KΩ	23KΩ	0Ω	230KΩ	
7	6SN7GT	275KΩ	82KΩ	1KΩ	115KΩ	265KΩ	0Ω	.25Ω	0Ω	
8	6V6GT	0Ω	0Ω	58KΩ	58KΩ	200KΩ	58KΩ	.25Ω	360Ω	
9	6SJ7	0Ω	0Ω	0Ω	47KΩ	.75Ω	168KΩ	.25Ω	168KΩ	
10	5U4G	58KΩ	58KΩ	58KΩ	50Ω	INF.	47Ω	58KΩ	58KΩ	
11	0C3/VR105	64KΩ	0Ω	62KΩ	62KΩ	62KΩ	90Ω	62KΩ	62KΩ	

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000)	REPLACEMENT DATA: HAMMARLUND PART NO.	REPLACEMENT DATA: STANCOR PART NO.	REPLACEMENT DATA: THORDARSON PART NO.	INSTALLATION NOTES
108	.097A	270Ω	16 Henries	6083	C-1001†	T-20C53†	†Mount vertically beneath chassis.
109	.055A	900Ω	35 Henries	6084	C-1708	T-20C52‡	‡Drill two new mounting holes

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDASON PART No.	INSTALLATION NOTES
110	‡117VAC @ .750A	600VCT @ .097A	5.2VAC @ 2.9A	6.5VAC @ 3.0A	26012	P-6313§	T-22R04§	§Use universal mounting brackets.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.		INSTALLATION NOTES
111	8500Ω	7Ω	310Ω	.75Ω	6086	A-3890	T-22S87		

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: JENSEN PART No.		INSTALLATION NOTES
	FIELD	VC IMP.		ST-121		
112	PM	7Ω		Mod. P10-R		
	CONE DIA.	VC DIA.				
113	9-3/8"	15/16"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: MEISSNER PART No.	INSTALLATION NOTES
114	5.4-1.32MC Ant.	21Ω	5Ω	26051-G1		
115	1.32-3.2MC Ant.	9Ω	1.5Ω	26051-G2		
116	3.2-5.7MC Ant.	.2Ω	.5Ω	6013		
117	5.7-10MC Ant.	0Ω	.1Ω	6016	14-1044	
118	10-18 MC Ant.	.1Ω	0Ω	6019	14-1046	
119	18-31 MC Ant.	0Ω	0Ω	6022		
120	RF Choke	38Ω		6181		
121	RF Choke	0Ω		26054-1		
122	.54-1.32MC RF	5Ω		26047-G2		
123	1.32-3.2MC RF	2Ω		26047-G1		
124	3.2-5.7MC RF	.5Ω		26047-G6		
125	5.7-10MC RF	.1Ω		26047-G5		
126	10-18MC RF	0Ω		26047-G4		
127	18-31MC RF	.1Ω		26047-G3		
128	.54-1.32MC RF	.2Ω	4Ω	26030-G2		

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HAMMARLUND PART No.	REPLACEMENT DATA: MEISSNER PART No.	INSTALLATION NOTES
129	1.32-3.2MC Osc.	.1Ω	1.5Ω	26030-G1		
130	3.2-5.7MC Osc.	.1Ω	.5Ω	26030-G2		
131	5.7-10MC Osc.	.1Ω	.1Ω	26030-G5		
132	10-18MC Osc.	.1Ω	.1Ω	26030-G4		
133	18-31MC Osc.	.1Ω	.1Ω	26030-G3		
134	1st IF	4.5Ω		6335		
135	2nd IF Output	5.5Ω	1Ω	SA785		Items 135, 136 are included in crystal filter assembly SA785.
136	2nd IF Grid Coil		7Ω	SA785		
137	3rd IF	4.5Ω		6335		
138	4th Output IF	6Ω		SA797		
139	Diode Input IF		6.5Ω	SA799		
140	BFO Osc.			26021-G1		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: HAMMARLUND PART No.		INSTALLATION NOTES
141	Bayonet	6-8	0.15	Brown	16004		Type 47
142	Bayonet	6-8	0.15	Brown	16004		Type 47
143	Bayonet	6-8	0.15	Brown	16004		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	HAMMARLUND PART No.	NOTES
144	Crystal	6338	Quartz
145	"S" Meter	4903	
146	Crystal Switch		
147	Switch	6097	Manual AVC-BFO
148	Limiter Switch	6333	
149	Band Switch	Assembly	
	A-H.F.Osc.Plate	6331	
	B-H.F. Osc.Grid	6332	
	C-Det.Grid Tap	6064	
	D-RF Plate	6063	
	E-RF Grid	6063	
	F-Antenna	6062	
150	Switch	6333	Send-Receive
151	Band Spread		(Part of SA-610)
152	Tuning Cap.	SA-604	Crystal Phasing
153	Tuning Cap.	SA-681	(Part of BFO Assby. 26021-G1)
154	Tuning Cap.	SA-617	(Part of SA-610
155	Tuning Cap.		" " "
	Trimmer Cap.	6189-G2	A19,A21,A27,A29
	Trimmer Cap.	6055-G1	A9,A11,A14,A16,A23,A25,A31,A33

ALIGNMENT INSTRUCTIONS

A cathode-ray oscilloscope and a frequency-modulated signal generator are required for proper alignment. Sychronize the scope externally with the signal generator. Set Send-Receive switch to Receive, the Limiter "off", the MAN-AVC-BFO switch to MAN. position and the crystal selectivity switch to "off" position. Set band spread dial at 200, gain and sensitivity controls at maximum and output from signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
.1 MFD.	High side to pin #4 (grid) of the third IF tube (5) Low side to chassis.	455KC	.54-1.32 MC	.54MC	High side to pin 5 of 6H6. Low side to chassis	A1,A2,	Adjust for maximum amplitude, symmetry and pattern coincidence on the scope.
"	High side to pin #4 (grid) of the second IF tube (4). Low side to chassis.	"	"	"	"	A3,A4	Adjust to obtain symmetrical, coinciding curve with as much amplitude as possible without disturbing the pattern.
"	High side to pin #4 (grid) of the first IF tube (3) Low side to chassis.	"	"	"	"	A5	Adjust for maximum amplitude at center of curve.
"	High side to grid cap of 6K8. Low side to chassis.	"	"	"	"	A6,A7.	Adjust to obtain symmetrical coinciding curve with as much amplitude as possible without disturbing the pattern. This should result in a tall selectivity curve with a slightly flattened peak. Pin 5 (osc grid) should be grounded to obtain clearer pattern.
"	"	"	"	"	"	A8	Turn crystal selectivity switch to position #1, set crystal phasing pointer on arrow. Keep input signal low to prevent overloading. Adjust A8 for maximum amplitude and symmetry.
Switch crystal selectivity to position #2 and adjust phasing control slightly from the arrow position, if necessary, to obtain identical images. Adjust the signal generator frequency to obtain coincidence of the images, and if complete coincidence is not obtained, alternately make slight adjustments of the phasing control and the signal generator frequency, until images coincide. These last steps have determined the exact frequency of the quartz crystal and the frequency setting of the signal generator should be left undisturbed. With signal generator at this setting turn crystal "off" and repeat carefully the complete IF alignment proceedure. The BFO may be adjusted if necessary by adjusting A35 for zero beat with beat oscillator setting at zero.							
The following adjustments should not be made unless it is positive that readjustment is necessary.							
200 MMF.	High side to ext. ant. Low side to chassis.	1.25MC	.54-1.32 MC	1.25MC	Connect output meter across voice coil.	A9	Adjust for maximum output.
"	"	.6MC	"	.6MC	"	A10	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	1.25MC	"	1.25MC	"	A11	Adjust for maximum output.
"	"	.6MC	"	.6MC	"	A12	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	.6MC	"	.6MC	"	A13	Adjust for maximum output.
400 ohms	"	3.0MC	1.32-3.2 MC	3.0MC	"	A14	" " " "
"	"	1.4MC	"	1.4MC	"	A15	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	3.0MC	"	3.0MC	"	A16	Adjust for maximum output.
"	"	1.4MC	"	1.4MC	"	A17	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	1.4MC	"	1.4MC	"	A18	Adjust for maximum output.
"	"	5.5MC	3.2-5.7 MC	5.5MC	"	A19	" " " "
"	"	3.5MC	"	3.5MC	"	A20	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	5.5MC	"	5.5MC	"	A21	Adjust for maximum output.
"	"	3.5MC	"	3.5MC	"	A22	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	10.0MC	5.7-10.0 MC	10.0MC	"	A23	Adjust for maximum output.
"	"	6.0MC	"	6.0MC	"	A24	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
"	"	10.0MC	"	10.0MC	"	A25	Adjust for maximum output.
"	"	6.0MC	"	6.0MC	"	A26	Adjust for maximum output. Repeat last two steps until no further increase is obtained.
" "	"	18.0MC	10.0-18.0 MC	18.0MC	"	A27	Adjust for maximum output
"	"	10.0MC	"	10.0MC	"	A28	Adjust for maximum output Repeat last two steps until no further increase is obtained.
"	"	18.0MC	"	18.0MC	"	A29	Adjust for maximum output
"	"	10.0MC	"	10.0MC	"	A30	Adjust for maximum output Repeat last two steps until no further increase is obtained.
"	"	30.0MC	18.0-31.0 MC	30.0MC	"	A31	Adjust for maximum output
"	"	18.0MC	"	18.0MC	"	A32	Adjust for maximum output Repeat last two steps until no further increase is obtained.
"	"	30.0MC	"	30.0MC	"	A33	Rock tuning capacitor and output for maximum output
"	"	18.0MC	"	18.0MC	"	A34	Adjust for maximum output Repeat last two steps until no further increase is obtained.

TECHNICAL SPECIFICATIONS

for

HAMMARLUND

SUPER-PRO

SERIES 400

Communications Receiver

TUNING RANGE—FIVE BANDS—

SP-400-X	
.54—1.24	mc.
1.24—2.86	mc.
2.85—6.3	mc.
6.3 —14	mc.
13.4 —30	mc.

BAND SPREAD—

Continuous coverage. All amateur bands are substantially spread out over the dial. Arbitrary scale reads 0-100. Operates only on three high-frequency bands on the SP-400-X.

TUBE LINE-UP—

6K7—First tuned R.F.
6K7—Second tuned R.F.
6L7—Mixer
6J7—H.F. Oscillator
6K7—First I.F. Amplifier
6SK7—Second I.F. Amplifier
6SK7—Third I.F. Amplifier
6H6—Second Detector
6N7—Noise limiter
6SK7—AVC driver
6H6—AVC diode
6SJ7—B.F. Oscillator
6J5—First A.F. Amplifier

TUBE LINE-UP—(Cont.)

6F6—Second A.F. Amplifier
2-6F6—Third A.F. Amplifier (Push-Pull)
5U4G—High Voltage Rectifier
5Y3GT/G—C-Bias Rectifier

ANTENNA INPUT—

Low impedence for balanced transmission lines and low noise pickup. 100 ohms approximately.

I.F. AMPLIFIER—

Three stages employing variable band width transformers. Coupling in transformers is mechanically varied over relatively wide limits to permit wide band high fidelity reception or narrow band for communications purposes.

CRYSTAL FILTER—

Six positions, three for phone reception and two positions for CW code reception, plus "off" position. This is a Hammarlund patent.

AUTOMATIC VOLUME CONTROL—

Operates on two R.F. stages and two I.F. stages. Holds output at steady level on voice and high speed code.

NOISE LIMITER—

Improved limiter provides high percentage of limiting without appreciably affecting modulated signals.

S-METER—

Calibrated 1 to 9 in steps of approximately 6 DB has external adjustment to compensate for antenna gain in order to provide correct readings for a given installation.

AUDIO OUTPUT—

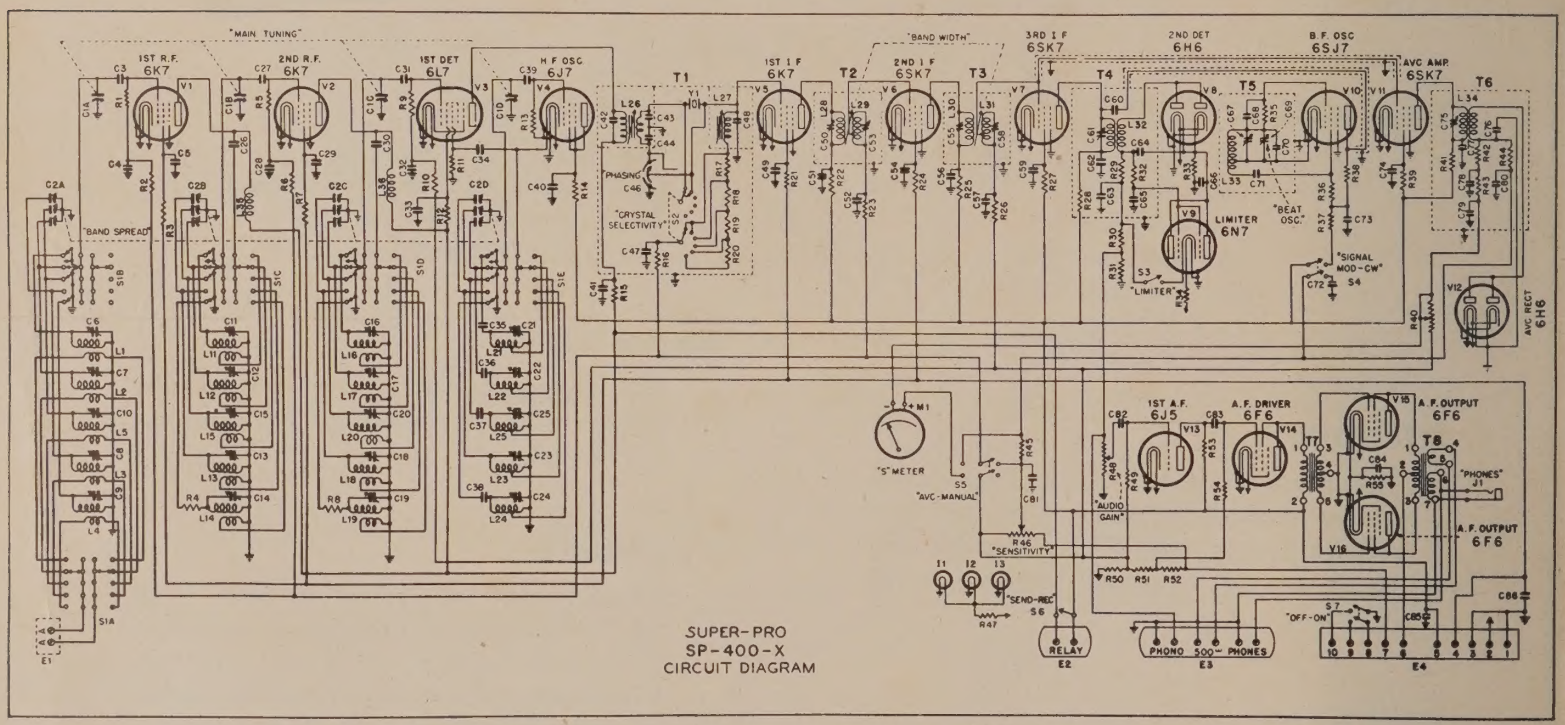
High quality, medium power using a pair of 6F6 pentodes in push-pull class AB employs potted transformers. Output impedance 500 Ohms. Connection for ear phones.

POWER SUPPLY—

A separate heavy duty unit, designed to supply heater, plate and bias voltages for hum free operation. Special models are available for wide variety of line voltages. Standard model operates on 115 voltage 50-60 cycle AC.

Amateur net price $347.25. Includes 10" P.M. speaker in cabinet to match receiver.

Above price subject to change without notice



SUPER-PRO
SP-400-X
CIRCUIT DIAGRAM

THE SIGN OF QUALITY
ESTABLISHED 1910

THE HAMMARLUND MFG. CO., 460 W. 34th ST., NEW YORK 1, N. Y.

MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

Printed in U.S.A.

SP-412-M121

AUTOMATIC VOLUME CONTROL—

Operates on RF and first two i.f. stages. Provides smooth, fast action.

NOISE LIMITER—

New series type provides better limiting and has less effect on modulation.

POWER SUPPLY—

Adequately filtered to provide hum-free reception. Input 115 volts 60 cycle AC. Special model available for 115-125-140-230-250 V 50-60 cycle operation.

POWER CONSUMPTION—

Approximately 120 watts.

PHYSICAL CHARACTERISTICS—

Overall Dimensions

13 15/32″ deep

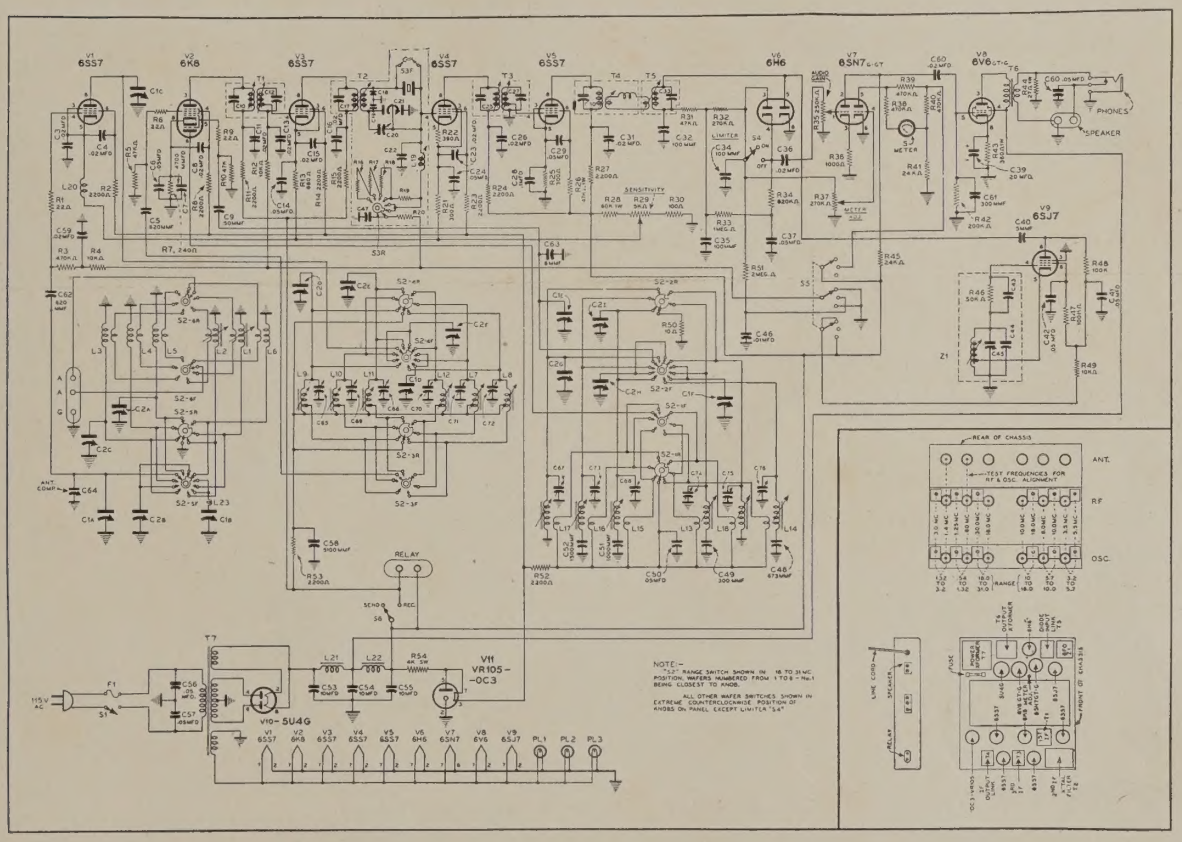
20 5/32″ wide

11 1/32″ high

Net weight less speaker, 52 pounds approx. Finished in two-tone grey. Speaker cabinet to match.

Amateur net price $173.25. Includes 10″ P.M. speaker in cabinet to match receiver.

Above price subject to change without notice



THE HAMMARLUND MFG. CO., 460 W. 34th ST., NEW YORK 1, N. Y.

MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

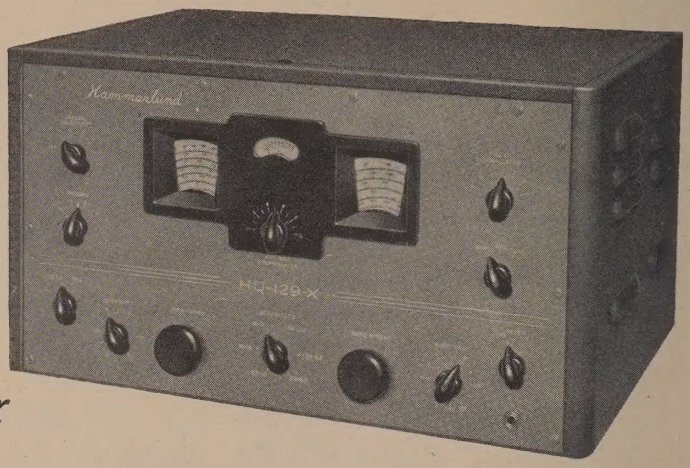
TECHNICAL SPECIFICATIONS

for

HAMMARLUND

HQ-129-X

Amateur Communications Receiver



TUNING RANGE—SIX BANDS—

The main tuning range is broken into six convenient bands to permit efficient circuit design. The main tuning dial is accurately calibrated for each band.

.54-1.32 mc.
1.32-3.2 mc.
3.2-5.7 mc.
5.7-10 mc.
10-18 mc.
18-31 mc.

CALIBRATED BAND SPREAD—

This feature is of special interest to amateurs. An arbitrary scale is provided to cover new bands which may become available at a later date. Calibrated for—

3.5-4 mc.
7-7.3 mc.
14-14.4 mc.
28-30 mc.

TUBE LINE-UP—

The tubes to be used in the HQ-129-X are available for replacement at any radio supply store.

6SS7 RF amplifier
6K8 converter
6SS7 first i.f. amplifier
6SS7 second i.f. amplifier

TUBE LINE-UP—(Cont.)

6SS7 third i.f. amplifier
6H6 second detector, A.V.C., noise limiter
6SN7 GT/G first a.f. and S-meter
6V6 GT/G audio output stage
6SJ7 beat frequency oscillator
5U4G—fullwave rectifier
OC3/VR105 voltage regulator

ANTENNA INPUT—

Impedance 400 ohms. Provides for the use of single wire antenna or balanced transmission line.

AUDIO OUTPUT—

Approx. three watts undistorted
6 ohms impedance

S-METER—

Calibrated 1 to 9 in steps of approximately 6 DB.

CRYSTAL FILTER—

Six positions, three for phone reception and two positions for CW code reception, plus "off" position. This is a Hammarlund patent.

ANTENNA COMPENSATOR—

Permits compensation for loading effects of various types of antennas and improves image ratio.